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Investigation of the Survivability of a Non-Ablative Aeroshell Composed of Carbon/Carbon Composites and Carbon Aerogel

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An investigation has been completed for the survivability of a Carbon/Carbon Non-ablative aeroshell structure design for the future Mars missions. The aeroshell design composed of a SiC coated Carbon/Carbon (C/C) facesheets and C/C core structure with a carbon aerogel insulation layer. Arc jet tests were performed under the simulated Mars entry heating conditions of scaled models. The test results show the design provided significant thermal insulation with the interior surface being less than 100 C using Mars Pathfinder entry thermal profiles. Detailed test results and the correlation between the measured data and the thermal modeling are discussed in this paper.